DOCUMENT RESUME

ED 034 705 24 SP 003 373

AUTHOR	Engle, Patricia L.; Sieber, Joan E.
TITLE	The Relation Between Human Figure Drawing and Test Anxiety in Children. Research and Development Memorandum No. 52.
INSTITUTION	Stanford Univ., Calif. Stanford Center for Research and Development in Teaching.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-5-0252
PUB DATE	Sep 69
CONTRACT	OEC-6-10-078
NOTE	29p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$1.55
DESCRIPTORS	*Anxiety, Elementary School Students, *Predictive Validity, Student Characteristics, *Testing
IDENTIFIERS	HFD, *Human Figure Drawing Test

ABSTRACT

To assess validity of the human figure drawing test (HFD) as a predictor of test anxiety, 27 HFD scoring indices were developed, yielding a total HFD score, cautiousness subscale, and poor-planning subscale. The sample of 57 girls and 76 boys chosen at random from grades 5 and 6 of a suburban upper-middle class school, completed HFD tests, a test-anxiety and defensiveness questionnaire, and a problem-solving task which yielded four behavioral measures. Intercorrelations of all measures, and stepwise regression analyses between subscales, six independent anxiety measures, and IQ were obtained. Findings indicate that total HFD scores were related to self-reported test anxiety (r=.40), defensiveness (r=.24), and response latency in problem solving (4=.91). Individual HFD indices and subscales had little predictive value. Results indicate limited clinical value of the HFD test as a predictor of test anxiety. (Rationale, implications, a 21-item bibliography, and the HFD scoring system are included.) (Author/JS)

ED034705

BR 5-0252 DM52
PA-24
OE/BR

STANFORD CENTER
FOR RESEARCH AND DEVELOPMENT
IN TEACHING

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OFFICE OF EDUCATION

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September 1969

Published by the Stanford Center for Research and Development in Teaching, supported in part as a research and development center by funds from the United States Office of Education, Department of Health, Education, and Welfare. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the Office of Education. (Contract No. OE-6-10-078, Project No. 5-0252-0504.)

SP003373

THE RELATION BETWEEN HUMAN FIGURE DRAWING AND TEST ANXIETY IN CHILDREN[1]

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Despite widespread use of the human figure drawing test (HFD) as a measure of anxiety, there is little empirical evidence of its validity. Over 500 validation studies have been reported, but the results have been inconsistent or ambiguous. Yet, clinicians maintain faith in their ability to make accurate intuitive global ratings from HFD protocols and are reluctant to subject their "insights" and predictions to scientific investigation. In reviews of the HFD literature, Roback (1968) and Swensen (1957) grant that intuitive global ratings of HFD protocols do, in fact, seem to have greater validity than ratings of specific signs. Unlike most clinicians, however, Roback concludes that validation of the HFD test depends on explication, standardization, and validation of such "global measures."

The Study

The present study was performed in an attempt to discover patterns which are predictive of test anxiety, defensiveness, and performance on a problem-solving task. To avoid some typical pitfalls of HFD test validation, the following steps were taken:

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[1]The authors wish to thank the principal, faculty, and students of the Almond School in Los Altos, Calif., for their cooperation throughout this study. Appreciation is also expressed to Professor Janet D. Elashoff for her advice concerning the data analysis.

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1. Testable hypotheses were derived from a theoretical analysis of the likely effects of test anxiety on HFD performance.

2. Explicit rules were formulated for interpreting HFD protocols. The only HFD scoring criteria used were those that could be scored reliably.

3. A weighted HFD scoring scale was developed by weighting criteria according to their previously demonstrated predictive power.

4. All HFD variables which previously have been found predictive of anxiety and which could be scored reliably were examined in relation to several other (independent) measures of test anxiety.

5. "Global" HFD variables, comprised of explicitly defined cue combinations, were examined in relation to other measures of test anxiety.

Two assumptions underlie the use of children's artistic productions as indicators of test anxiety: (a) anxiety affects motivation, cognition, and performance, and (b) these effects are reflected in the individual's drawings of human figures.

Background

The theories and research on which these two assumptions are based also provide the rationale and predictions of this study. Let us consider, therefore, the basis of these two assumptions and the predictions which follow.

The first assumption, that anxiety affects motivation, cognition, and performance, has been extensively documented (e.g., Spielberger, 1966; Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960). It is generally acknowledged that the way in which test anxiety manifests itself depends on the degree of anxiety, the situation in which it occurs, and the individual's characteristic mode of response. Accordingly, anxiety may reveal

itself in numerous ways, varying from admission of nervousness to denial of warranted fear, and from overly meticulous caution to impulsive blundering through or avoidance of test situations. Some more precise predictions about the effects of anxiety on motivation, cognition, and performance are offered by S-R theory and also by psychoanalytic theory.

In terms of S-R theory, Spence and Spence (1966) have postulated that (a) anxious persons are highly responsive to stimulation, and (b) there is an interaction between level of responsiveness (anxiety) and task difficulty, which affects performance. Thus, high-anxious persons should perform rapidly and well on simple problems because the energizing quality of anxiety strengthens task-relevant responses. However, they should perform poorly under conditions of pressure and problem difficulty, since overgeneralized habits and task-irrelevant responses such as fear and anger are intensified, impairing selection and integration of responses. However, the relationship between anxiety and performance is apparently more complex than Spence's theory would predict. Evidence indicates that when anxious persons perform complex tasks and are given ample opportunity to acquire relevant information, they tend to be cautious, to consider much information before acting and to perform well (Waite, 1959). High intelligence, as well, may dispose anxious persons toward cautious and superior performance (Spielberger, 1966). Conversely, anxiety that is manifested as defensiveness or denial of warranted fear is highly detrimental to performance on difficult or unstructured tasks (Ruebush, Byrum, & Farnham, 1963).

According to psychoanalytic theory (Freud, 1925; May, 1950; Mowrer, 1950; Sullivan, 1953; Sarason, et al., 1960), anxiety stems from punishment for aggressive impulses. Persons become apprehensive or anxious

whenever exposed to cues associated with punished acts. Therefore, they defend themselves by ignoring cues that have been associated with punished impulses and by repressing impulse-related thoughts. Hence, these impulse-related thoughts usually are not available to consciousness except under conditions of anxiety when repressed impulses erupt into awareness. To summarize briefly, psychoanalytic theories hold that anxiety affects cognition both by making certain thoughts unavailable and by causing an uncontrollable intrusion of thoughts upon consciousness.

The second assumption underlying the use of the HFD as an indicator of anxiety is that such motivational, cognitive, and performance changes as have been mentioned above affect the drawing process. Various interpretations of the drawing process support this assumption.

The interpretation that the content of a child's drawing reflects his internal psychological state has been the rationale for most uses of the HFD test (e.g., Machover, 1949; Hammer, 1958). According to this interpretation, for instance, an anxious child might draw a tense, unhappy-looking figure. For, as psychoanalytic theory would suggest, images which are normally repressed by anxious persons may erupt in the drawing task. These images might also include abnormal characteristics such as a shaded body, teeth, overemphasis of sex characteristics or extreme distortion. Tests of this projective interpretation of HFD have generally yielded negative results, however (Swensen, 1957; Lublin & Lublin, 1967).

Drawing may also be viewed as a problem requiring of the artist skills of observation, representation, and organization (e.g., Werner, 1957). Since anxiety may interfere with problem solving (Spence & Spence, 1966; Spielberger, 1966), some anxious persons should draw poorly

planned, poorly integrated figures, which are poorly oriented on the page, distorted, and simplified. This would be especially likely in the case of defensive or low-IQ persons. In the case of very bright or low-defensive persons, however, anxiety may have facilitating effects (Spielberger, 1966; Wallach & Kogan, 1965). The HFD task is presented with little pressure for an immediate response, and the emerging goal or product is continuously visible. Bright or low-defensive anxious persons, therefore, would be expected to consider their task thoroughly, and to evaluate their own performance extensively. Their drawings might therefore be characterized by light or sketchy lines, small size, variable pressure, much detail, erasure, and redrawing.

Relatedly, HFD may be interpreted as a measure of mental age. Harris (1963), in his revision of the Goodenough Draw-A-Man test of mental age, utilized 73 indices of ability to represent the human figure. He postulated three stages through which drawing progresses as the child matures. If anxiety differentially facilitates overlearned responses, as Spence and Spence (1966) predict, then anxious children's drawings should resemble those of younger children. Thus, for instance, anxious children's drawings might include use of a continuous heavy line and simplification of body and head, which are indicative of earlier developmental levels (Harris, 1963).

Hypotheses

To summarize briefly, we have inferred that test anxiety may result in one or two patterns of HFD response: (a) poorly planned, primitive, or distorted drawings from which details have been omitted, or (b) cautiously and precisely executed drawings in which much detail is included,

and any errors are corrected before finishing. Presumably, then, an HFD anxiety-rating scale which considers manifestations of cautiousness and of poor planning should predict scores on test-anxiety questionnaires, and some aspects of behavior in test situations. Further, HFD subscales measuring cautiousness and poor planning should predict certain manifestations of test anxiety better than total HFD scores. Accordingly, the following hypotheses were advanced: (a) HFD test-anxiety scores are positively correlated with self-report anxiety-scale scores, experimenter rating of subjects' anxiety, and failure in a difficult problem-solving task. (b) HFD Poor-Planning Subscale scores (PPS) are positively related to defensiveness and motor-activity level, and negatively related to response latency in a difficult problem-solving test. Moreover, PPS scores are better predictors than HFD test-anxiety scores of these variables. (c) HFD Cautiousness Subscale scores (CS) are negatively related to defensiveness and motor activity, and positively related to response latency in a difficult problem-solving task. Moreover, CS scores are better predictors than HFD test-anxiety scores of these variables.

Method

Subjects and Design

Subjects were 57 girls and 76 boys chosen at random from grades five and six of a suburban upper middle-class school in California. These children were administered the HFD test, and a test-anxiety and defensiveness questionnaire. About one month later, the same children individually were administered a puzzle under test-like conditions, from which the following dependent measures were obtained: number of trials to criterion, latency and first response, and experimenter's rating of level of anxiety and level of motor activity. After completing the puzzle, each child completed another HFD test. Both HFD tests were scored on 27 criteria.

Scores on the California Test of Mental Maturity were also obtained. Each child's total HFD test-anxiety score, Cautiousness Subscale score (CS) and Poor-Planning Subscale score (PPS) were calculated. Pearson product-moment coefficients of correlation were obtained between all measures. Stepwise regression analyses were then performed to determine (a) how much of the variance in the PPS and CS could be accounted for by each of the independent test-anxiety measures, and (b) how much of the variance in each test-anxiety measure could be accounted for by the PPS and CS.

Procedure

Subjects were taken to a testing room in their school building in groups of eight at a time. They were seated at a table and given the Test-Anxiety, General-Defensiveness and Test-Defensiveness subscales of a modified version of the Test Anxiety Scale for Children (TASC) which is described elsewhere (Wallach & Kogan, 1965). The following instructions were given:

> I would like you to answer some questions telling what some of the things are that you especially like to do and don't like to do, and how you feel about certain kinds of things. This is not a test. There are no right or wrong answers. The only right answer is the way you honestly feel. What is true for you might not be true for another person. Your answers will not be shown to your teacher or to any other people. Your answers will be used by us to see whether the way you feel about these things has anything to do with the way you go about doing some other kinds of things, like the way that you go about solving some puzzles. It is important for us to learn this because we're interested in finding ways of helping students both to feel happier in their school work, and to do well in their school work. Remember, the way you answer this questionnaire depends entirely on your own feelings. In order to help us and to answer this properly, the thing that is important is for you to think over each statement carefully and answer it honestly by telling just what is really true for you.

After the first page of the TASC was completed, the children were told:

> Before you go on, will you turn to the back of page one, please, and take three or four minutes to draw a picture of a man, not just his head, but the whole figure. Ready, begin.

If specific questions arose about the task, the children were told to draw a sensible person. They were allowed four minutes to complete the drawing, and then completed the second page of the TASC after which they were told:

> O. K. Turn over page two and draw a picture of a woman -- not just her head, the whole figure.

After drawing a woman, Ss completed the TASC and returned to their classroom.

About a month later, the same children were returned individually to the testing room, and each was told that he was to take part in a research project and was expected to do as well as possible. Inside the testing room, he was greeted by the experimenter and given a puzzle to solve. This puzzle consisted of a board containing a row of nine evenly spaced holes, over which four black and four white marbles were placed. The middle hole was uncovered, the black marbles were over the holes on one side, and the white marbles over the holes on the other side. The puzzle was solved when the marbles of the two respective colors were moved to the end of the board opposite their starting position. Only two types of moves were permitted: forward (i.e., toward the opposite end of the board) to an adjacent hole, and forward over one adjacent marble of the opposite color to an empty hole. There was only one sequence of twenty-four moves that resulted in the solution. Any other sequence of moves led to an impasse. The task was difficult because a

wrong move did not result in an impasse until two moves later. Hence, the task was primarily one of remembering what configuration of marbles at each juncture led to an impasse two moves later.

During task performance, the experimenter recorded the number of trials to solution and latency to first move of a marble, and rated the child's level of anxiety and motor activity, each on a three-point scale.

After completing the puzzle, the child was given a plain sheet of paper with a layer of carbon paper and another paper underneath, and requested to draw a picture of a man. After completion, he was given a second sheet of paper with carbon and bottom sheet attached, and requested to draw a picture of a woman. He was then escorted back to his classroom.

Scoring of HFD protocols. The characteristics of HFD responses which were used as indices of test anxiety were derived from the HFD literature, primarily from the reviews of Jones and Thomas (1965), Machover (1949), and Handler and Reyher (1965). The 29 indices initially selected consisted of all reported HFD anxiety indices that were judged to hold some promise of validity and reliability. Exact scoring procedures were developed for each index. Each was scored as present or absent, and when possible, a quantitative estimate of the amount of that characteristic was made.

Scoring reliability was determined by having two judges read the directions for scoring, then rate the same practice protocols in the same order. These judges then discussed their practice ratings briefly, after which they independently rated other protocols. The procedure was then repeated with two other judges. Percent of agreement between two judges on a given variable was computed as number of agreements/total number of drawings scored. Percent of agreement on individual HFD variables

ranged from .50 to 1.00. Percent of agreement on total HFD score was computed as number of agreements/number of protocols scored. The average percent of agreement on total HFD scores was .88.

Two of the indices which could not be scored with greater than 75% agreement were discarded. Each of the remaining 27 scoring indices was weighted according to prior evidence of its predictive validity. Indices that had been found most predictive of anxiety were weighted most heavily. The sum of weighted scores for each drawing yielded the HFD test-anxiety score. The final set of indices, their method of scoring, and the weighted scale values are shown in Appendix 1.

The Poor-Planning Subscale (PPS) and the Cautiousness Subscale (CS) were then developed as follows: (a) A review was made of that literature which suggests that different types of anxiety would result in differential HFD performance. It was concluded that the most prominent modes of anxiety-related HFD performance were ones which indicated either primitiveness and poor planning, or overcautiousness. (b) Based on inspection of protocols, a list was made of the indices that usually "went together." (c) These groups of indices were then subsumed, wherever relevant, under the categories of poor planning (PPS) or cautiousness (CS). The PPS and CS indices are presented in Appendix 2.

Results and Discussion

Analysis of Scores

Before testing the major hypotheses, analyses of variance were performed on HFD test-anxiety scores to determine whether there were any differences due to the sex of the figure drawn, or to the time of administration. An analysis of sex-of-drawing by time-of-administration, within

subjects, was performed separately on boys' and girls' HFD test-anxiety scores. No significant effects were observed. T-tests were then performed to compare boys' vs. girls' HFD test-anxiety scores. In the case of both the first ($t = 2.74$, $df - 57$, $p < .01$) and second ($t = 3.27$, $df = 57$, $p < .01$) drawing of the female figure, and the first drawing of the male figure ($t = 2.71$, $df - 57$, $p < .01$), boys' anxiety scores significantly exceed those for girls.

Differences in the drawings according to the sex of the artist have been reported previously (Lourenso, Greenberg, & Davidson, 1965; Stewart, 1955; Harris, 1963). Girls' drawings have generally been found superior to boys'. This difference in skill may account for the observed sex-difference in HFD test-anxiety scores.

Intercorrelation of total HFD scores and other measures of test anxiety. Each child's HFD test-anxiety scores were summed over his four drawings to provide his total HFD test-anxiety score (hereafter called total HFD score). Intercorrelations of the total HFD score, the six other measures of test anxiety, IQ, and the scores on each of the 27 individual HFD scoring indices (summed over the four drawings) for all children are presented in Appendix 3. In Appendix 4, separate matrices are presented for boys and girls. (For girls, no correlation coefficients were obtained for variable 10, since teeth did not appear on any of the girls' HFD protocols. Teeth appeared on HFD protocols of 16% of the boys.) Most of the correlations of individual HFD indices with other measures of test anxiety were insignificant. Total HFD scores, however, were significantly related to the TASC measure of test anxiety ($r = .40$, $p < .01$). The correlation was higher for girls ($r = .50$, $p < .01$) than for boys ($r = .38$, $p < .01$).

The correlation with the TASC measure of defensiveness was significant for boys ($r = .31$, $p < .01$) and for all subjects ($r = .24$, $p < .01$), but not for girls. Only the boys' HFD scores were significantly related to IQ ($r = .28$, $p < .05$). Latency to first response was related to HFD scores both for boys ($r = .94$, $p < .01$) and for girls ($r = .84$, $p < .01$). The predicted relationship between the experimenter's rating of anxiety and total HFD scores was not supported.

This pattern of correlations suggests sex differences in the way in which anxiety is manifested. Boys' total HFD scores were related to defensiveness and IQ as well as to TASC test-anxiety scores; further, boys' defensiveness was related to motor-activity level ($r = .27$, $p < .01$). Girls' total HFD scores, however, were highly related to TASC test-anxiety scores and to response latency, which in turn was negatively related to trials to criterion ($r = -.31$, $p < .02$). Apparently, the girls tended to respond to anxiety-arousing situations by admitting anxiety and operating cautiously, while boys are more prone to respond defensively and with a high level of motor activity.

The PPS and CS were then examined in relation to the other measures of test anxiety. The hypothesis that PPS scores would be positively related to defensiveness and motor-activity level and negatively related to response latency was not supported. However, PPS scores were related to number of trials to criterion ($r = .24$, $p < .01$). The hypothesis that CS scores would be negatively related to defensiveness and motor activity, and positively related to response latency, also was not supported. However, CS scores were related to TASC test-anxiety scores ($r = .23$, $p < .05$).

Stepwise regression analyses of subscales. As remarked earlier, subscales were devised and tested because of clinicians' claims that certain patterns of HFD responses, rather than individual HFD characteristics, may be the most valid indicators of anxiety. Since anxiety may manifest itself in various ways, PPS and CS scores were correlated with six different measures of test anxiety. However, none of our initial hypotheses concerning subscale correlates were supported. Therefore, the following exploratory analyses were undertaken. Two stepwise regression analyses were performed to determine (a) how much of the variance in the PPS and CS scores could be accounted for by each of the other six test-anxiety measures and IQ, and (b) how much of the variance in each test-anxiety measure and in IQ could be accounted for by the PPS and CS subscale scores.

With the PPS as the dependent variable, trials to criterion and TASC test-anxiety scores both contributed significantly to the variance; after all the other variables were included, IQ scores also contributed significantly. These three variables, together, accounted for about 11% of the variance ($r = .36$). In the case of the CS, however, the full regression accounted for only 3% of the variance ($r = .19$).

Still less predictive power was realized when the PPS and CS were used as independent variables with IQ and the other six measures of test anxiety as the dependent variables. The best prediction by PPS and CS scores was of TASC test-anxiety scores ($r = .24$). And the least predictive power in the relation to the experimenter's rating of the subject's anxiety, in which case, the subscales accounted for .04% of the variance ($r = .02$).

The hypothesis that PPS and CS scores are better predictors than total HFD scores of defensiveness, motor-activity level, and response latency was clearly rejected. However, these negative results obviously do not weaken clinicians' claim that response patterns are better predictors than individual indices. For, while no single HFD variable predicted other measures of test anxiety, total HFD scores were surprisingly good predictors of test anxiety, defensiveness (in the case of boys), and latency to first response in problem solving. But it is not obvious how best to characterize the predictive aspects of HFD performance.

Given the variety of ways in which test anxiety is manifested, it is tempting to continue to search for highly predictive HFD subscales. Theories of anxiety, however, do not suggest obvious new routes for such inquiry. Another possible route would be purely empirical factor-analytic explorations. And a third, more obvious, way would be to obtain more precise weights for each HFD index through linear regression techniques. But, while such procedures are likely to increase the predictive power of the HFD test, it seems unlikely that a combination of sufficient predictive power and scoring ease would be obtained to make the HFD test preferable to other measures of test anxiety.

To summarize, the potential value of the HFD test as a clinical measure of test anxiety seems limited. In its present form the total HFD score accounts for only about 25% of the variance in a self-report test-anxiety measure. Therefore, it is not ordinarily an adequate index of test anxiety. For clinical purposes, the present results suggest that, at best, the HFD should be only one instrument in a battery of test-anxiety measures.

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APPENDIX 1

HFD Scoring System

Variable and Range of its Weighted Score	Scoring Rules
1: Body simplification 0 - sophisticated form	Score 0 if protocol has <u>all</u> of the following characteristics: a. definite, appropriately shaped body outline; head, neck, shoulders, arms, and legs well integrated into body outline b. human-like shape and proportioning c. adequate profiling (e.g., trunk and legs facing same direction) d. consistent, appropriate detail (e.g., presence of clothing, facial expression, and shoes)
3 - average form	Score 3 if drawing is neither sophisticated nor primitive. For example, average form may have: a. shoulders shaped, but too square b. waist indicated only by a belt c. legs not flowing naturally from body; shapeless legs and arms d. human-like, but poorly executed, outline
6 - primitive form	Score 6 if protocol has <u>any one</u> or more of the following characteristics: a. circles or ovals for body or limbs b. triangular or rectangular body with limbs stuck on c. other forms lacking human-like shape (e.g., absence of waist, shoulders, etc.) d. limbs in form of sticks or ovals, shapeless, or ending in pronglike or clawlike toes or fingers e. contact point of limbs to trunk involving overlapping or transparent joining; limbs stuck on or detached (as opposed to integrated body parts) f. grossly unequal-sized arms, legs, ears, fingers, etc., combined with primitive form g. indiscriminately attached or misplaced body parts (e.g., arms attached at center of trunk) h. neither clothing nor well-defined nudity

2: Head simplification 0 - no simplifications 2 - one simplification 4 - two simplifications or more	Possible simplifications: a. simplified face outline; no contour of cheeks, forehead, or chin (e.g., head represented by circle, or no indication of a chin b. simplified features, all features represented by circles, ovals, dots, or lines--not individualized, no pupils, etc. c. simplified neck, straight lines for boundaries of neck, no modulation or shaping of neck at chin edge or at shoulder edge, or no neck indicated
3: Omission of arms 0 - arm(s) and hand(s) present (e.g., profile view) 2 - one or both hands not present, but indicated as hidden 4 - hand(s) not present, but no indication of hiding 6 - arm(s) not present	Score 2 when hand(s) are obviously hidden behind the back or in the pockets, or otherwise not visible because of posture of the figure. Score 4 when arms are drawn but hands are not indicated even though the place where the hands should have been is visible. Hands are defined as any attempt to indicate fingers, or a widening of the arm into a specific type of ending.
4: Omission of legs 0 - both present, or covered by a full-length dress 2 - foot or feet only missing 4 - leg(s) and foot (feet) missing	Feet missing refers to instances in which legs are portrayed down to the ankle area, but no attempt is made to draw a widening or delineation to indicate a foot.
5: Number of features Score = 9 minus the number of features shown. If more than 9 features, score 0.	Count as one feature: each eye, pupil, eyebrow, nostril hole, each lip, nose, set of eyelashes or an eye, all freckles, set of rosy cheeks, set of dimples, moustache. Do not score ears as features.

6: Ears and sex characteristics Male drawing: 0 - ears showing or hidden by hair 2 - ears omitted but should have been visible Female drawing: 0 - bust line indicated 2 - hair and skirt but no bust line 4 - either hair or skirt 6 - no hair, skirt, or bust line	Bust line refers to lines under bust to indicate shape, or an obvious contour change in the line of the body.
7: Distortion 0 - none 4 - present (excluding head-body ratio)	Score 4 only if the proportions of the figure are obviously abnormal. Distortions may include too long a neck, too small or short arms or hands, too large or too small feet, too low a waist, etc. Score length of arms distorted only if they are shorter than the waist or longer than half way down the legs. Distortion also includes placing the body in impossible positions (e.g., a leg bent the wrong way).
8: Smile 0 - smile 2 - no smile 4 - no mouth drawn	Smile refers to an upward curve in the main line (between lips) of the mouth. If the mouth consists of only 2 lines, score as smile only if the bottom line is curved and the top line is either straight or curved in the same direction.
9: Centering 0 - centered 2-8 - off center	Divide an 8 1/2 x 11 inch plastic overlay into quarters, horizontally, and into thirds, vertically. Place over drawing and score as follows: a. if feet are (i) below the horizontal midline, score 0 (ii) above the horizontal midline, but not above the first-quarter line, score 2 (iii) above the first-quarter line, score 4 b. if more than half the body is in the vertical center portion, score 0 if more than half of the body is in right portion, score 2 if more than half of the body is in left portion, score 4 c. add the scores from a and b for final centering score

10: Presence of teeth 0 - no teeth 4 - teeth shown	Teeth may be indicated by crosslines in the mouth
11: Arms raised 0 - neither arm raised 2 - one arm raised 4 - two arms raised	On a clean plastic overlay, draw a horizontal and a vertical axis dividing the overlay into quarters. Then in each bottom quadrant draw two lines extending downward from the origin at a 45° angle. Place the overlay on the protocol and adjust it so that the origin is at the base of the figure's neck. Score as raised arm instances in which the part of the arm (above the elbow) is above the diagonal line, except when hands are on hips.
12: Balance 0 - oriented<30° from vertical 2 - oriented>30° from vertical	On a clear plastic overlay, draw a horizontal and a vertical axis, dividing the overlay into quarters. Then, draw two lines, which intersect at the origin of the horizontal and vertical axes and extend at 5° angles to the vertical axis. Place the origin at the feet of the figure. Score as oriented> 30° if the vertical axes of the figure is tilted more than 30° in either direction; otherwise, score 0.
13: Figure size (deviation score) Deviation score = absolute value of (4.5 - actual size of figure)	To find "actual size" of figure, measure distance from the bottom to the top of the figure and round to the nearest 1/4 inch. Figure includes a hat or high heels. Do not estimate the complete size of incomplete figure.
14: Head/body ratio 0 - normal 2 - head too large 4 - head too small	Score 0 if: height of head is less than 1/5 height of whole figure or more than 1/8 height of figure. Score 2 if height of head is greater than or equal to 1/5 height of figure. Score 4 if height of head is less than or equal to 1/8 height of figure.
15: Pressure (deviation from normal) 0 - normal (3) 2 - medium-heavy (4) 4 - very heavy (5) 2 - medium-light (2) 4 - very light (1)	Examine the entire sample of protocols, and select samples corresponding to these five categories. Construct a five-point standard consisting of these five levels of pressure. Score according to amount of pressure in the majority of the figure boundary. If in doubt, degree of pressure can be determined with greater precision by examining the reverse side of the drawing or the carbon copy.

16: Variability of pressure 0 - mostly consistent 4 - variable	If a significant portion of the body such as an arm or leg is drawn with pressure noticeably different from that of the main portion of the body, score as variable. Presence of a small emphasis line is not scored as variable.
17: Emphasis line 0 - no emphasis line 2 - emphasis line 2 categories darker than rest of drawing (e.g., a very heavy emphasis line on a normal drawing 4 - emphasis line 3 or more categories darker than rest of drawing (e.g., a very heavy emphasis line on a medium light drawing	Emphasis line is a line drawn at a heavier pressure level than the majority of the drawing. The area emphasized is usually small in comparison with the rest of the drawing; typical areas emphasized are features, fingers, bottom of chin, top of shoulder. If the figure is chiefly variable, and the majority is judged the darker portion, score emphasis line present only if there is a small but significant portion heavier than this majority. Shaded areas may also be emphasized; however, since it is possible to make these areas dark without strong pressure, check the carbon to determine strength of pressure in comparison with the rest of the figure.
18: Reinforcement 0 - none 2 - present in less than 1/2 of figure boundary 4 - present in more than 1/2 of figure boundary	Reinforcement refers to two or more parallel or superimposed lines delimiting one portion of the figure (i.e., two or more lines are used to mark the limits of the figure when only one was necessary). If one large segment of the drawing, or the whole drawing, is redrawn, without erasing the first set of lines, do not score as reinforcement. For instance, it is common to draw the figure first very lightly and sketchily, then to redraw the whole figure with a fairly heavy and continuous line. Score this as redrawing, not reinforcement. Do not include hair shading or body shading. Do not score emphasis lines (17) or line discontinuity (20) as reinforcement.
19: Delineation line absence 0 - all delineation lines present 4 - some absent	A delineation line is a line marking the boundary between two body areas or between clothing and body. Common examples are: no line between arm and body, dress with no neckline, shoes with no top, shirt with no sleeves. Score 4 if no neck or if clothing neckline is not indicated. A foot is considered shod unless toes are shown.

20: Line discontinuity 0 - mainly continuous 2 - less than 1/2 of figure boundary discontinuous 4 - more than 1/2 of figure boundary discontinuous	Discontinuous lines are sketchy, fragmented, or broken lines. They may also include instances in which the child does not lift his pencil from the paper, but breaks the smoothness of the line with "ears" or jagged portions. If a figure has obviously been completely redrawn with a totally different type of line, score it according to the second drawing. A line can be <u>discontinuous</u> without being <u>reinforced</u>.
21: Hair shading 0 - hair indicated by lines or hair area outlined 2 - outline of hair darkened without regard for direction 4 - no hair indicated	If lines are drawn to indicate individual hairs, or the direction of hairs, score 0. If an outline of hair is drawn but not filled in, score it 0 also. If lines are used to indicate that the area is darker, but individual hairs are not shown, score it 2. If a hat obviously obscures any possible sight of hair, score it 2.
22: Body shading 0 - none 2 - shading of clothes 4 - shading of fleshy parts of body, with or without shading of clothes	Shading of clothes includes any lines or spots on clothing which might suggest design or decoration, but does not include indications of buttons, belts, or ties, unless these (ties) are also shaded. Shading generally refers to pencil strokes designed to fill in an area, as in coloring or darkening a shirt, or to illuminate a contour of the body; 4 does not include <u>hair shading</u>.
23: Erasure 0 - none 2 - less than half of lines erased 4 - more than half of lines erased	The extent of erasure can be determined by inspection of the carbon copy.
24: Redrawing 0 - none or less than one body part redrawn once 2 - one body part redrawn once 4 - one body part redrawn more than once or more than one part redrawn	Redrawing can generally be ascertained by inspection of the carbon copy. It may or may not occur after erasure; some parts are redrawn without erasing the former. A body part refers to a whole unit such as arm, leg, or head. Redrawing of less than a whole body part is not scored as redrawing.

25: Humor, theme,or movement
- 0 - presence of humor, theme,or movement
- 2 - none of these present

Humor: a characteristic of the drawing, which could be considered humorous, such as a lady with a bottle emitting a "hic."
Theme: any addition of objects or background (other than a few lines to indicate ground) beyond clothes, hat, and body. For instance, if an object of any sort is held, score 0.
Movement: body posture which suggests clearly defined action, such as walking, running, or throwing a ball.

26: Size
- 0 - smaller than 4.5"
- 1 - 4.5"
- 2 - larger than 4.5"

Measure distance from the bottom to top of the figure and round to the nearest 1/4 inch. Figure includes a hat or high heels. Do not estimate the completed size of incomplete figures.

27: Heaviness
- 0 - very light or medium light
- 1 - normal
- 2 - medium heavy or very heavy

Use scale and instructions given for 15: Pressure: deviation from normal.

APPENDIX 2

HFD Variables Comprising PPS and CS

Poor-Planning Subscale (PPS)	Cautiousness Subscale (CS)
1. Body simplification	5. Number of features*
2. Head simplification	8. Smile
3. Omission of arms	16. Variability of pressure
4. Omission of legs	17. Emphasis line
5. Number of features	18. Reinforcement
6. Ears and sex characteristics	20. Line discontinuity
7. Distortion	23. Erasure
8. Smile*	24. Redrawing
9. Centering	25. Humor, theme, or movement
11. Arms raised	26. Size*
12. Balance	27. Heaviness*
14. Head/body ratio	
17. Emphasis line*	
18. Reinforcement*	
19. Delineation line	
20. Line discontinuity*	
21. Hair shading	
25. Humor, theme, or movement*	
26. Size	
27. Heaviness	

*To obtain the subscale score for this variable, subtract the HFD score obtained for this variable from its maximum possible HFD score. (E.g., if the obtained HFD score on variable 8: Smile = 0 then the PPS score on variable 8 = 4.)

APPENDIX 3

Correlations Among the 27 HFD Variables, Total HFD Score, IQ, Self-Report Measures of Test Anxiety and Defensiveness and Four Measures of Problem-Solving Behavior, for all Subjects[a]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HFD Variables																																			
1. Body.....	-																																		
2. Head.....	57	-																																	
3. Arms.....	04	10	-																																
4. Legs.....	-01	04	37	-																															
5. Features.....	34	22	11	-05	-																														
6. Ears/sex.....	35	43	03	07	11	-																													
7. Distortion...	53	31	-04	00	13	17	-																												
8. Smile.....	-37	-44	-07	-05	-16	-18	-08	-																											
9. Centering....	14	11	01	07	21	11	-03	-03	-																										
10. Teeth.....	14	01	-13	-07	05	-09	08	-10	-02	-																									
11. Arms raised..	41	37	-10	04	22	24	30	-13	08	13	-																								
12. Imbalance....	24	22	05	-02	-02	18	09	-05	19	-08	13	-																							
13. Body size....	11	00	10	-02	-09	01	13	-01	02	01	05	-07	-																						
14. Head/body....	34	21	-12	-05	16	19	30	-08	04	01	44	-04	02	-																					
15. Pressure.....	13	05	14	-11	-07	-01	03	03	04	03	-13	-08	15	-08	-																				
16. Variability..	-09	-09	04	02	03	-14	-06	11	-09	00	-18	-10	-07	-06	-21	-																			
17. Emphasis line	-14	-26	-06	-02	-04	-15	-11	10	-15	05	-25	-09	-03	-07	-06	42	-																		
18. Reinforcement	-34	-49	-04	00	-05	-26	-19	26	-11	00	-23	-20	00	-18	-09	20	47	-																	
19. Delineation..	53	32	-16	-09	18	26	32	-13	-06	05	33	06	08	25	09	05	05	-04	-																
20. Discontinuity	-41	-53	-06	-06	-09	-22	-21	29	-17	-06	-28	-25	-01	-16	-07	16	49	79	-06	-															
21. Hair shading.	27	29	-08	09	34	27	10	-18	25	07	13	07	-11	10	-13	-03	-13	-14	26	-20	-														
22. Body shading.	05	09	03	02	03	00	05	-05	17	00	13	09	-05	07	-11	04	-04	-07	-11	-17	06	-													
23. Erasure.....	-12	-05	09	11	-12	02	-05	12	-04	-03	-15	-03	-04	-05	04	25	13	00	-09	-01	-12	-19	-												
24. Redrawing....	07	09	-08	-04	-07	10	11	05	-14	-05	-06	00	-09	01	22	21	02	-17	06	-12	-07	-17	56	-											
25. Theme.....	01	10	04	06	-21	04	07	-01	01	-19	-15	03	02	-28	04	-10	08	12	07	15	02	-14	08	02	-										
26. Size.....	-25	-31	-07	-09	-32	-15	07	20	-42	-05	-22	-16	20	-09	02	-06	12	16	-05	23	-19	-21	05	11	18	-									
27. Heaviness....	21	39	-04	00	12	14	18	-12	20	09	22	08	-09	18	-01	-08	-58	-43	-02	-61	20	10	05	12	-16	-20	-								
28. Total HFD....	22	16	-03	-04	02	05	07	-01	03	14	16	-10	14	11	15	-09	00	-12	02	-11	00	03	-10	-07	05	00	01	-							
Other measures																																			
29. IQ (CTMM)....	-05	-04	13	-06	03	-15	-12	-14	19	-07	-05	09	-07	-27	-03	-03	-07	06	-02	03	07	06	-09	-06	03	-16	-04	-18	-						
30. Test anxiety.	31	15	-06	-05	06	18	17	-05	10	13	21	05	16	13	08	-06	-08	-18	13	-13	-05	-03	06	19	-02	01	06	40	-28	-					
31. Defensiveness	07	11	-12	-06	05	-10	06	-13	05	06	-02	-04	-04	13	02	05	02	-02	-08	-06	05	12	-02	-11	-18	-13	10	24	-39	02	-				
32. Anxiety (E)..	03	00	01	05	-01	-05	02	03	10	11	03	-01	02	06	-06	00	09	07	02	06	02	00	-14	-22	02	-14	-04	09	-01	13	06	-			
33. Activity (E).	22	08	-17	02	05	19	03	-11	-01	03	01	-07	02	14	06	-16	-03	-09	13	-08	15	04	-08	-03	-11	11	01	08	-20	11	24	11	-		
34. Trials.....	30	19	-02	-04	14	09	26	-12	01	06	08	03	16	21	09	00	02	-13	17	-10	06	-15	10	-01	-01	01	12	05	-23	14	09	05	14	-	
35. Latency.....	08	07	02	-02	-02	00	-02	06	-02	09	10	-12	10	02	12	-05	01	-05	-03	-05	-01	04	-13	-10	10	03	-04	91	01	10	01	-01	-07	-14	-

Note. - r = .169 for $p < .05$, r = .221 for $p < .01$.

[a]Decimal points omitted.

APPENDIX 4

Correlations Among the 27 HFD Variables, Total HFD Score, IQ, Self-Report Measures of Test Anxiety and Defensiveness and Four Measures of Problem-Solving Behavior, for Girls and Boys[a]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HFD Variables																																			
1. Body.....	-	37	01	12	32	13	51	-40	08	xx	26	26	00	23	15	14	03	-27	30	-29	05	05	00	18	-20	-26	-04	06	02	26	24	00	03	26	-15
2. Head.....	70	-	17	08	22	42	27	-55	10	xx	31	26	-14	18	08	-11	-27	-47	11	-45	21	22	-04	13	-19	-35	39	00	-01	14	25	-02	-10	-08	-11
3. Arms.....	16	09	-	40	21	-03	-11	-17	04	xx	13	-08	-04	02	04	00	-05	05	-15	03	-13	18	13	-20	-05	-30	-02	-18	15	-14	-08	05	-12	03	-12
4. Legs.....	-01	06	28	-	02	26	08	-02	-67	xx	35	-02	-15	01	-21	06	06	07	-02	-02	12	16	11	-09	01	-13	-06	03	-28	00	02	-08	16	-01	03
5. Features.....	28	19	15	-01	-	00	26	-13	35	xx	15	03	-09	04	-09	-03	-06	00	-08	-08	15	-20	-11	-16	-06	-26	03	03	-06	19	21	12	-14	18	-13
6. Ears/sex.....	46	42	13	13	16	-	-12	-19	18	xx	08	13	-22	10	03	-08	-11	-17	06	-11	40	01	16	18	-13	-16	18	12	-22	21	00	06	23	-06	03
7. Distortion...	51	33	07	-01	-02	34	-	-12	-05	xx	37	04	04	16	-09	23	17	-15	26	-21	-12	09	-10	08	-03	01	-05	04	06	18	05	05	-19	24	-07
8. Smile.....	-38	-32	02	-15	-17	-16	-03	-	-01	xx	-24	-15	04	-13	00	07	16	39	-02	29	-13	-19	22	14	14	31	-06	-02	-18	-03	-23	14	12	-06	05
9. Centering....	15	11	02	34	07	03	-04	-03	-	xx	18	-03	-11	11	03	-25	-29	-15	-13	-17	39	08	02	-15	03	-26	24	11	18	21	05	09	04	-03	02
10. Teeth.....	09	-03	-11	-04	-02	-15	05	-15	-07	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
11. Arms raised..	42	40	-14	-06	20	29	25	-08	03	10	-	-08	-09	22	-14	09	-14	-11	33	-13	03	02	11	-04	-13	-23	06	06	-07	32	06	07	-01	08	-10
12. Imbalance....	21	19	15	01	-08	20	09	04	32	-12	18	-	-18	03	08	-01	19	-23	03	-16	19	15	-08	15	-02	-15	-03	-03	-14	13	08	-07	03	-02	-11
13. Body size....	19	13	24	19	-11	23	20	-09	14	01	11	01	-	12	23	05	05	15	13	26	-16	-20	12	04	00	33	-29	27	04	16	-09	03	02	04	24
14. Head/body....	35	22	-16	-06	18	23	34	-02	-03	-04	50	-10	12	-	-10	15	15	03	23	-04	-04	-11	27	07	-41	-17	10	-03	-23	07	21	-07	-03	31	-15
15. Pressure.....	12	03	23	04	-06	-04	12	07	05	03	-15	-18	07	-07	-	-22	00	-13	08	-09	-19	07	-12	02	-09	06	-05	24	03	10	15	-02	08	10	16
16. Variability..	-21	-07	07	-03	08	-18	-22	16	03	01	-27	-14	-16	-16	-20	-	20	14	31	09	11	-19	31	30	01	13	01	-11	-16	10	-21	06	-32	30	-12
17. Emphasis line	-28	-27	-04	-10	-05	-18	-31	04	-04	05	-33	-26	-11	-21	-11	57	-	52	27	51	-27	-14	11	01	25	35	-61	00	-32	-06	-06	03	08	30	-01
18. Reinforcement	-47	-53	-07	-06	-14	-36	-26	13	-09	-03	-33	-21	-16	-35	-06	24	42	-	-01	81	-28	-25	12	-23	25	32	-46	07	-20	-21	-13	11	-02	20	17
19. Delineation..	58	46	-03	00	21	37	29	-23	-09	-06	28	04	05	19	10	-10	-14	-15	-	09	-04	-11	21	24	04	14	-17	-04	-01	17	-21	-10	-17	35	-09
20. Discontinuity	-51	-59	-12	-13	-11	-30	-23	31	-18	-08	-36	-31	-26	-24	-05	20	48	77	-18	-	-31	-31	05	-19	36	34	-70	05	-10	-16	-27	11	07	13	17
21. Hair shading.	27	33	14	33	36	14	13	-23	09	-06	07	-05	-07	09	-12	02	-09	-15	23	-15	-	20	01	03	00	-12	18	-03	-09	18	11	09	16	-17	-13
22. Body shading.	-01	-02	-01	-05	10	-03	-02	09	22	-04	13	05	06	13	-22	16	00	01	-22	-09	-11	-	-18	-15	-01	-27	09	07	22	-09	05	00	05	-22	12
23. Erasure.....	-12	-03	-04	02	-04	-05	04	-02	-05	04	-21	04	-20	-21	19	22	18	-06	-18	-06	-07	-15	-	59	-03	06	04	-05	-16	28	-06	-16	-11	17	-16
24. Redrawing....	09	10	-06	-06	06	06	19	-07	-11	-02	-02	-08	-22	02	39	15	04	-10	06	-06	-04	-16	51	-	-04	21	19	-01	-18	34	-06	-17	-11	03	-13
25. Theme.....	14	29	07	10	-27	16	14	-16	01	-21	-14	07	04	-21	12	-16	-01	06	15	02	09	-19	12	04	-	33	-31	01	26	-14	-32	-08	-12	-17	19
26. Size.....	-20	-26	04	-12	-32	-13	17	07	-53	-01	-19	-16	09	00	-01	-19	-03	06	-08	15	-16	-15	-03	-01	09	-	-36	15	-03	05	-32	-05	17	06	22
27. Heaviness....	32	39	-01	13	14	08	31	-18	15	09	27	13	09	22	01	-15	-58	-43	00	-54	17	08	10	10	-05	-05	-	-09	05	17	17	-02	-21	-12	-14
28. Total HFD....	28	24	05	-11	01	01	08	00	-03	16	18	-13	08	17	11	-04	-01	-23	03	-19	01	02	-13	-10	07	-08	06	-	-09	50	12	-02	21	-09	84
Other measures																																			
29. IQ (CTMM).....	-12	-07	15	24	05	-12	-24	-10	19	-12	-07	21	-17	-32	-08	04	10	23	-09	11	13	-04	00	05	-08	-23	-11	-22	-	-29	-42	-06	-21	-13	17
30. Test anxiety.	47	19	-06	-22	03	18	22	-10	03	25	24	01	16	22	07	-19	-09	-13	24	-11	-13	04	-21	01	03	-08	08	38	-27	-	12	14	14	16	05
31. Defensiveness	-07	-02	-13	-13	-13	-20	04	00	04	05	-08	-13	00	07	-09	22	08	05	-06	10	-06	14	05	-12	-09	04	02	31	-39	-04	-	-05	17	07	-22
32. Anxiety (E)..	03	01	00	25	-13	-13	-02	-08	10	13	01	01	01	12	-09	-03	14	02	07	02	-08	00	-10	-25	09	-19	-07	16	01	15	13	-	17	-15	-12
33. Activity (E).	26	17	-13	-04	10	14	10	-35	-09	-03	-04	-15	02	19	05	-07	-13	-17	13	-19	00	-02	02	09	-09	13	13	01	-23	16	27	06	-	-09	07
34. Trials.....	32	33	-03	-05	12	15	27	-17	02	06	07	04	25	16	08	-13	-13	-33	09	-22	17	-13	07	-02	06	-04	24	10	-29	14	09	16	25	-	-31
35. Latency.....	16	17	10	-04	02	-02	-01	07	-05	09	15	-13	01	09	11	-02	02	-18	-03	-17	03	00	-11	-08	07	-07	01	94	-06	15	14	05	-15	-09	-

Note. - Girls to right and above diagonal, r = .266 for p <.05, r = .335 for p <.01;
Boys to left and below diagonal, r = .224 for p <.05, r = .290 for p <.01.

[a]Decimal points omitted.

APPENDIX 5

Correlations Among PPS and CS Subscales, IQ, Self-Report Measures of Test Anxiety and Defensiveness, and Four Measures of Problem-Solving Behavior

	PPS	CS
IQ (CTMM)	.05	-.09
Self-report test-anxiety score	.20*	.01
Self-report defensiveness score	.07	.11
E's rating of anxiety	-.01	-.02
E's rating of activity	.10	-.08
Trials to criterion	.24**	-.03
Latency to first response	.04	-.04
PPS	-	-.29**

** $p < .01$, * $p < .05$